

UNITED STATES DISTRICT COURT
DISTRICT OF MASSACHUSETTS

YUKIO KUSADA,
Plaintiff

vs.

NORTHFIELD MOUNT HERMON
SCHOOL, FRANCIS MILLARD and
MICHAEL ATKINS,
Defendants

Civil Action

No.: Civil Action No.: 05-30043-MAP

AFFIDAVIT OF LAWRENCE E. THIBAUT, SC.D.

I, Lawrence E. Thibault on oath depose and say:

1. I reside at 9 Creekview Circle, West Chester, Pennsylvania.
2. I have an Sc.D. in Mechanical Engineering from George Washington University received in 1979.
3. From 1971 to 1980 I was a research engineer with the National Institute of Health, Biomedical Engineering Branch.
4. From 1980 to 1984 I was an Assistant Professor of Bioengineering and Neurosurgery at the University of Pennsylvania School of Engineering and Applied Science and the School of Medicine.
5. From 1984 to 1991 I was an Associate Professor of Bioengineering and Neurosurgery at the University of Pennsylvania, Department of Bioengineering, School of Engineering and Applied Science and the School of Medicine.
6. From 1991 to 1994 I was a Professor and Chairman of the Department of Bioengineering at the University of Pennsylvania, School of Engineering and Applied Science.
7. From 1991 to 1995 I was a Professor of Bioengineering in Neurosurgery and Orthopedic Surgery at the University of Pennsylvania, School of Medicine.

8. From 1982 to 1995 I was an Associate Director of the Head Injury Center, Department of Neurosurgery, School of Medicine, at the University of Pennsylvania.

9. From 1990 to 1995 I was the Executive Director, Laboratories for Injury, Research and Prevention at the Department of Bioengineering, University of Pennsylvania.

10. From 1995 to 1998 I was a Professor in Neurosurgery and Director of the Division of Bioengineering in the Department of Neurosurgery at Allegheny University of Health Sciences.

11. From 1998 to 2001 I was a Professor in the School of Biomedical Engineering, Science and Health Systems, Drexel University.

12. In 2000 I founded Biomechanics, Inc. and remain a principal in the company.

13. Biomechanics is a well established branch of biomedical science and engineering dedicated to elucidating the mechanisms of human injury and determining qualitatively the thresholds at which injury to the human body occurs.

14. I have authored or co-authored in excess of 250 papers and presentations, mostly on various aspects of the biomechanics of head injury.

15. I am the recipient of the Bertil Aldman Award from the International Research Council on the biomechanics on impact, contributions to impact, trauma, research and head injury. I am the recipient of the Melville Medal from the American Society of Mechanical Engineers, the Nicholas Andry Award from the American Association of Bone and Joint Surgeons and the William Stickle Award from the American Academy of Podiatric Surgeons.

16. I am the recipient of the Best Scientific Paper Award, from the Association for the Advancement of Automotive Medicine – Brain Injury Biomechanics.

17. I have served as Chairman of the Bioengineering Division for the American Society of Mechanical Engineers.

18. I have been the principal or co-principal investigator for 20 studies related to the biomechanics of head injury for entities including the National Institute of Health, the U.S. Department of Transportation, General Motors Corporation, the Centers of Disease Control and the National Football League.

19. I have served as Chairman of the Bioengineering Division for the American Society of Mechanical Engineers.

20. I have reviewed the medical records of Yukio Kusada in connection with injuries he suffered on February 20, 2004. Records reviewed confirm that Mr. Kusada suffered traumatic brain injury, diffuse axonal injury, right occipital subdural hematoma, right temporal epidural hematoma, right posterior sub arachnoid hemorrhage, right sphenoid fracture, left occipital epidural hematoma with contusion in addition to leg injuries.

21. The method available to estimate Mr. Kusada's impact velocity is the failure criteria for his various scalp, skull and brain injuries.

22. Based upon the biomechanical data Mr. Kusada's impact velocity was approximately 20 miles per hour, which would be reasonably associated with a Delta V of 20 miles per hour. Anything in excess of this value would have most probably caused comminuted and depressed skull fracture. There is no discussion of such trauma in the medical records.

23. Helmets are designed to absorb energy and to reduce the stresses acting upon the head in an impact event.

24. During Mr. Kusada's impact with the tree, the stopping distance of his head would be approximately 3/8 of an inch which represents a full scalp compression and skull bending prior to fracture.

25. During Mr. Kusada's impact with the tree, the stopping distance of his head was approximately 0.38 inches, which represents a full scalp compression and skull bending with fracture.

26. A helmet would provide at least 1.00 inch of stopping distance, excluding shell deformation, attenuating and distributing the impact load acting on Mr. Kusada's head. This would reduce the forces acting on Mr. Kusada's head by approximately 300%.

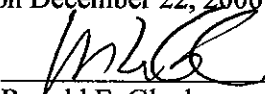
27. A helmet would have prevented skull fracture, contusions to the brain and it would have substantially reduced the diffuse axonal injury (DAI) and the acute subdural hematoma. I named the white matter injury DAI in 1982.

Signed under the pains and penalties of perjury this 19th of December, 2006.

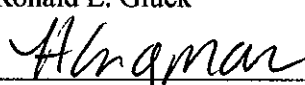

Lawrence E. Thibault, Sc.D.

Certificate of Service

I, certify that this document filed through the ECF system will be sent electronically to the registered participants as identified on the Notice of Electronic Filing (NEF) and paper copies will be sent to those indicated as non-registered participants on December 22, 2006 via first class mail.



Ronald E. Gluck



Heather A. Engman

March 31, 2006

Ronald E. Gluck, Esquire
Breakstone, White-Lief & Gluck, P.C.
Two Center Plaza, Suite 530
Boston, Massachusetts 02108-1906

RE: Yukio Kusada

Dear Mr. Gluck:

Please accept this letter as a biomechanical analysis and report regarding the above-referenced matter. The following materials were received for review in the preparation of this report:

- Photographic report and video prepared by James Isham;
- Color copies of photographs of the accident site;
- Site inspection video;
- Supplemental report of Frank Field;
- Report of Douglas Katz, M.D.;
- Various medical records and reports regarding Yukio Kusada.

The incident in question occurred on February 20, 2004 at Berkshire East Ski Resort in Charlemont, Massachusetts. Yukio Kusada was night skiing, was unaccounted for and presumed to be missing. Medical records indicate that Yukio Kusada was found on February 21, 2004 by using thermoimaging. The records also indicate that he had been missing anywhere from 5-10 hours.

A report prepared by volunteer ski patroller Frank Field indicates that Yukio Kusada was found right near the bottom of Big Chief. He was off the trail and in the woods. He observed Yukio Kusada's body in a supine position at the base of a large tree. He was being tended to by other ski patrollers. Rod Fielding indicated that in addition to an obvious head injury, he suspected that the left femur may be broken. Frank Field conducted an examination of the head and cervical spine. He noticed an abrasion of approximately 2 inches in diameter above the right eye on the forehead. Pupils were dilated and slightly unequal in size. The right pupil seemed to dilate slightly further when exposed to light. Each eye rotated inward toward the bridge of the nose after being exposed briefly to the light from a penlight. Cervical collar was secured around the neck and patient was secured to a backboard for transport via sled from the scene to the ski patrol base station.

ER clinical record: head injury skiing. Unresponsive, posturing. Intubate. Good breath sounds. Found unconscious. Not found for \approx 10 hours. Unconscious. Right pupil dilated, left pupil reactive. Abrasions, hematoma right temporoparietal. CHI.

Medical/surgical H&P: skiing vs. tree. Night skiing, missing for 8 hours, found unresponsive and posturing. Right facial abrasion. Posturing. Edema left calf. Right facial laceration with ecchymosis.

2/21 CT cervical spine
No evidence of cervical spine injury.

2/21 CT abdomen
No abdominopelvic injury.

2/21 CT head

Multiple areas of parenchymal contusion including the left temporal lobe posteriorly, the right caudate, and the frontal lobes bilaterally with small areas of hemorrhage. Subarachnoid hemorrhage in the interpeduncular and perimesencephalic cistern. Subdural blood layering along the tentorium. Epidural hematoma anterior to the tip of the right temporal lobe measuring up to 15 mm from the inner table of the skull. Small extra-axial collection in the posterior fossa on the right, which may be either an epidural or a subdural hematoma. May be a fracture around the region of the right lambdoidal suture adjacent to the extra-axial collection. Fracture transversely through the greater wing of the sphenoid on the right. Also fractures of the anterior and medial wall of the right maxillary sinus.

Impression:

- Epidural hematoma anterior to the right temporal lobe
- Extra-axial collection in the posterior fossa on the right
- Subdural blood layering along the tentorium
- Subarachnoid hemorrhage in the interpeduncular and perimesencephalic cisterns
- Multiple areas of parenchymal cerebral contusion.
- Fracture of anterior medial wall of right maxillary sinus
- Fracture of greater wing of the sphenoid on the right
- Possible fracture near the lambdoidal suture on the right.

2/21 ICU note

Skiing last night, last seen at 7:30 p.m. Unable to locate until early a.m. Found unresponsive and posturing. Intubation difficult but successful. GCS estimated at 4. Sedated and paralyzed. Neuro: waking up slightly.

Brief Medical Summary:

2/21/04 BHSA-Greenfield EMS Report

Chief complaint: head injury.

Present illness: fall, internal bleeding, sporting event, unconscious.

Trauma: sports related, high speed, impact; patient believed to have hit a tree or large hole when skiing. Found outside after several hours; blunt trauma; struck stationary object.

Patient clenching teeth and posturing arms. Increased resps and heart rate. Started a little sweating/incontinent of urine. Yet at times responsive (groaning) to pain (palpation of left lower leg). Upper body warm. Lower body cooler/feet cold yet good color (+ pulses).

Head face: raccoon eyes, abrasions, closed head injury, hematoma, swelling.

Left eye: dilated.

Right eye: abrasion, blunt injury. No reaction, swollen, dilated.

Both eyes posturing at times. Unable to get a reaction from pupils. Right orbit + cheek swollen. Dried blood right temporal area. Forehead swollen + above right ear.

Patient's left arm flexed to chest. Right arm either flailing around or flexing. Both hands making fists. Patient did groan initially when palpating left shinbone area. Removed ski boots—feet cold yet color good. Later patient just winced with palpation of left leg. Closed head injury—probable subdural. GCS=5.

Obtunded; ski accident; probable closed head injury. ? left leg injury. Obvious swelling to right side of head/face, right orbit bruise. A little dried blood on face/hair—no obvious lacerations. Patient posturing=left arm to chest, right arm flailing and both hands making fists, teeth clenching. Shallow resps but clear. Some groaning when palpating lower left leg.

2/21-3/10/04 Baystate Medical Center

Trauma: skier found down for approximately 4 hours. Found down in trees with decorticate posturing. Unresponsive on arrival with spontaneous respirations. Right pupil 5mm reactive, left pupil 3mm reactive. Lower left extremity red, tight, no deformity. GCS=5.

Trauma clinical record: found down at Berkshire east ski resort. Right pupil 5mm, left pupil 3mm, both reactive. Was in field for 5-6 hours. Right scalp/face abrasion. Decorticate posturing. Hematoma. Left leg with abrasion and edema anteriorly.

hematoma, right posterior subarachnoid hematoma, right sphenoid fracture, left occipital epidural hematoma with contusion and axonal injury. Found to have compartment syndrome of the left lower extremity. Mental status improved during stay. Transfer to Rehab.

3/10/04 BHSA-Springfield EMS Report

Transfer to Spaulding Rehab Hospital. Head injury. Nursing staff states that patient has been non-verbal since brought in. Alert to surroundings. Transport without incident.

3/10-4/9/04 Spaulding Rehab Hospital

3/25/04 report of Paul Wang, D.O.: admitted to brain injury rehab program. Receiving physical therapy, occupational therapy, speech-language pathology. Attention and arousal seemed to improve with Ritalin. Complaints of left foot pain in the sole of his foot. Slight decreased dorsiflexion. May be secondary to a left peroneal nerve injury. Also some neuropathic pain; started Neurontin. Trigger points located in his left gastrocnemius muscle and performed injections. 6 episodes of lockjaw which were reduced. Lockjaw may have been due to some muscle spasming. Decreased insight and awareness as well as decreased trunk control which has improved significantly. Moderately severe cognitive deficits including disorientation, decreased attention and impaired short term memory, working memory and problem solving. Improved verbal initiation. Overall pleased with his progress.

3/29 & 4/1/04 report of Kaaren Bekken, Ph.D.: neuropsychological evaluation. Estimated above average intellectual capacity presents with many areas of compromise after severe TBI. Verbal skills appear to be more affected than visual skills. Significant inattention, lexical access, verbal expression and executive function difficulties affect functioning across domains. Academic skills fall well below expectation with the exception of math calculation and well below the levels expected for attained educational level. Results are consistent with TBI.

4/9/04 Discharge summary: discharge diagnoses:

- Traumatic brain injury status post axonal injury, status post right occipital subdural hematoma, right temporal epidural hematoma, right posterior subarachnoid hemorrhage, right sphenoid fracture, left occipital epidural hematoma with contusion.
- Status post left compartment syndrome; status post fasciotomy.
- Decreased range of motion of the left ankle most likely secondary to prolonged lack of movement; Achilles heel contracture.
- Status post G tube.
- Status post tracheostomy.

Return to Japan and continue cognitive therapy. If improved return to U.S. to take some college courses at a community college.

2/22 CT head

No increased bleeding in the previous described hemorrhages and no new hemorrhage. No appreciated on the previous study is a right parietal bone nondisplaced fracture. Worsening right sided scalp edema.

2/23 Consultation

Night skiing, missing for 8 hours. Found responsive, posturing. GCS=4. Right temporal EDH, left [sic?] occipital EDH, right posterior SDH, occipital SDH, axonal shear, right sphenoid fracture, left tib/fib fracture. Severe TBI; status post left fasciotomy.

2/24 MRI cervical spine

Negative; note is made of subarachnoid hemorrhage in the posterior fossa.

2/25 CT head

Perhaps slight increase in the posterior temporal subdural hemorrhage. Stable subdural hemorrhage in the right inferior temporal lobe. No change in the right tentorial subdural hematoma. Stable intraventricular hemorrhage in the right lateral ventricle. Decreased amount of subdural hematoma seen below the level of the 4th ventricle. Contusions are stable in the right frontal lobe and in the anterior aspect of the right lateral ventricular horn, consistent with diffuse axonal injury. Small right posterior fossa epidural hematoma may be somewhat slightly decreased in size.

3/1 CT sinuses

Persistent sinus disease improved since 2/22/04. Bilateral facial fractures are again noted without change.

3/3 Operative report

Procedure: upper GI endoscopy with percutaneous endoscopic gastrostomy tube placement.

Postoperative diagnosis: severe closed head injury, inability to take oral food, malnourishment, pneumonia. Sinusitis, left compartment syndrome status post fasciotomy.

Procedure: debridement and closure of fasciotomy sites.

3/10 Discharge Summary

Final diagnosis:

Epidural hematoma. Skiing accident. Found around a tree in the woods after 8-9 hours. Thermoimaging was used to find him. GCS=4 at admission. CT of the head revealed right occipital subdural hematoma, right temporal epidural

11/11 & 12/15/05 Margaret O'Connor, Ph.D.

Neuropsychological evaluation. Received cognitive rehab in Japan and in China. Returned to U.S. in August 2005 to resume his academic work on a limited basis. Currently a freshman at Boston University. Receiving note taking help, tutoring and extra time on examinations. Resumed outpatient therapies at Spaulding Rehab Hospital. Reports persistent problems with memory, attention and general reasoning abilities. Also reports problems with his left foot, a dislocated jaw and back pain.

Findings indicate global and persistent cognitive deficits affecting attention, memory, analytic abilities and processing speed. Presents as confused, lethargic and depressed. Overall level of performance was far below expectations based on his baseline level of intelligence. Cognitive deficits have and will continue to undermine his academic progress and daily living skills for an indefinite period of time. Deficits fall in the severe range of impairment. Deficits are permanent. Clinical experience has been that patients with severe cognitive impairments have significant limitations in terms of occupational abilities.

On 2/27/06, a neurological evaluation was performed by Douglas Katz, M.D. The report indicates: traumatic brain injury in a skiing accident on 2/20/04. Severe diffuse axonal injury, left leg compartment syndrome, significant residual cognitive impairments, depression. "I believe it is unlikely that he will be able to complete college level studies at Boston University. I believe it is also likely that the effects of this injury will permanently limit his vocational capacity and ability to attain and maintain employment in the future." A ski helmet would have prevented brain injury or significantly reduced the severity of the brain injury.

Biomedical Engineering and Scientific Analysis

We were asked to review and analyze the file material associated with this unfortunate incident. Our analysis is directed toward the biomechanics of the documented injuries and the mechanisms associated with each and every reported injury sustained by Mr. Kusada that are consistent with the published injury tolerance data. It is hoped that the biomechanical analysis will help shed light on the issue of "Injury Mechanisms" and, thereby, help provide insight into the circumstances of this accident. Further, we have been requested to address the issues associated with head protection.

The study of the biomechanics of human injury is a widely recognized, well-established branch of biomedical science and engineering dedicated to elucidating the mechanisms of human injury and determining quantitatively the thresholds at which injury to the human body occurs. This serves two purposes: determining quantitatively the thresholds at which injury to the human body occurs in order to develop improved strategies for injury control, and to

understand the injury at the tissue and cellular level as well as the systemic level in order to develop new approaches for therapeutic intervention. A biomechanical analysis of the subject incident depends, in part, on the diagnoses and findings documented by clinicians in the medical record. The medical records were reviewed in this instance to analyze the potential injury mechanisms associated with the subject accident.

While clinicians are trained to examine, diagnose and treat injury, the biomechanical engineer seeks to determine the mechanism of a particular injury through application of formal training in engineering, life sciences, advanced mathematics, and physics. Quantitative assessments of injury mechanism can be objectively analyzed using principles of biomechanics to determine the potential for the injuries allegedly sustained during the incident in question when the forces acting on an individual are compared to published injury tolerance criteria. The clinician should not attempt to determine the causal relationship between the forces generated by a given event and the diagnosed injury unless they are also formally trained in biomechanics and have analyzed the events.

The magnitude of an applied external force can be related to the probability of injury, and injury severity has been quantified for each part of the human anatomy in the Abbreviated Injury Severity Handbook. The American Medical Association, and the Society of Automotive Engineers have assembled this Handbook in joint efforts with the Association for the Advancement of Automotive Medicine. Reference volumes of experimental biomechanical literature such as The Handbook of Human Tolerance contain injury tolerance values and data for failure of various tissues of the human body. The data for the development of these invaluable tools has come from human cadaver studies, animal experiments, physical model studies, isolated tissue research, anthropomorphic test device experiments, human volunteers and real world accident analysis. The volume of research findings related to injury mechanics has grown substantially over the past 25 years, particularly with regard to CNS trauma. We now understand the mechanisms of specific forms of trauma from the macroscopic level to the cellular level in many instances. This has permitted us to better define the associated injury tolerance levels and in particular injury to the central nervous system.

Mr. Kusada sustained an impact to the right frontal and lateral aspects of his head when he left the trail upon which he was skiing. According to the medical record there were clear data to fully describe the resulting pathology. In this case the head impact produced scalp contusion, underlying skull fractures, distributed contusions of the brain, and hemorrhage at various locations including the subarachnoid, epidural and subdural spaces. There was also a discussion of Diffuse Axonal Injury. The forces required to generate this injury portrait are at a level in excess of approximately 1500-2500 pounds.

The facts of this incident teach us that Mr. Kusada's body was located within the vicinity of a tree, which was located off of the ski trail. It is estimated that he was in that location for 8-9 hours before he was found. It is also clear that he had no head protection, i.e., he was not wearing a helmet at the time of his impact with the tree. The only method available to estimate his impact velocity is the failure criteria for his various scalp, skull and brain injuries. Based upon the biomechanical data his impact velocity was approximately 20 mph, which would be reasonably associated with a Delta-V of 20 mph. Anything in excess of this value would have most probably caused comminuted and depressed skull fracture. There is no discussion of such trauma in the medical record.

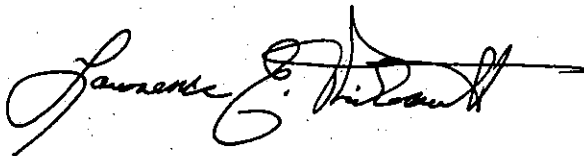
Helmets are designed to absorb energy and to reduce the stresses acting upon the head in an impact event. They are very effective in this regard.

During Mr. Kusada's impact with the tree the stopping distance of his head would be approximately 3/8 in., which represents full scalp compression and skull bending prior to fracture. A helmet would provide at least 1.0 in. of stopping distance, excluding shell deformation, attenuating and distributing the impact load acting on Mr. Kusada. This would reduce the forces acting on Mr. Kusada's head by approximately 300%. The helmet would prevent skull fracture, contusions to the brain, and would have substantially reduced the ASDH and DAI.

These opinions are offered with a reasonable degree of biomedical engineering and scientific certainty. References are available upon request.

I will supplement this report as additional information may become available.

Yours truly,



Lawrence E. Thibault, Sc.D.



Kirk L. Thibault, Ph.D.

LAWRENCE E. THIBAUT

**Curriculum Vitae
January 2003**

ADDRESS:

Home: 106 Keepsake Lane
Chadds Ford, PA 19317

Former Academic Positions: Professor and Chairman Bioengineering
University of Pennsylvania
Philadelphia, Pennsylvania (Resigned)

Professor and Director
Injury Research Institute
School of Biomedical Engineering, Science
And Health Systems
Drexel University
Philadelphia, Pennsylvania (Retired)

Biomechanics Inc: 439 South Governor Printz Blvd.
Essington, Pennsylvania 19029

PHONE:

Home: 610-459-4702
Office: 215-271-7720 Fax: 215-271-7740
E-mail: lthibault@biomechanicsINC.com

SOCIAL SECURITY NO: 188-34-9128

DATE OF BIRTH: September 23, 1943, Philadelphia, PA

EDUCATION:

B.S., Drexel University, 1967
M.S., George Washington University
Sc.D., George Washington University, 1979
M.A., (Honorary) University of Pennsylvania, 1984

Thesis - The Effects of Hydrodynamically Induced
Shear Stress on Transmural Transport Processes in the
Artery Wall - Advisors, S. Yuan and J. Feir

SCHOLARSHIPS:

Department of Defense Scholarship, U.S. Navy,
Undergraduate Engineering Education, Drexel University

National Institutes of Health Fellowship, Graduate Education
and Research in Bioengineering, George Washington
University, in a consortium with Georgetown University,
The Catholic University of America, and NIH

HONORS and AWARDS:

Bertil Aldman Award, International Research Council on the
Biomechanics of Impact - contributions to impact trauma
research in head injury (macro to micro levels)

Nicholas Andry Award, Association of Bone and Joint
Surgeons - cervical spine injury biomechanics

Fellow, AIEMB

Best Scientific Paper Award, Association for the
Advancement of Automotive Medicine - brain injury
biomechanics

William Stickle Gold Award, American Academy of Podiatric
Surgeons - vascular injury at the cellular level

ASME Bioengineering Division, Best Scientific Paper Award
- calcium transmembrane transport in cellular injury

Melville Medal, American Society of Mechanical Engineers
- strain dependent calcium flux in trauma to the cell
membrane....Mechanoporation

Award of Merit, Association for the Advancement of
Automotive Medicine - biomechanics of central nervous
system injury in the automotive crash environment

Chairman, Bioengineering Division, American Society of
Mechanical Engineers

Chairman, Alliance for Engineering in Medicine and Biology

POSITIONS HELD:

1963-1969	Research Engineer U.S. Naval Ship Engineering Center Philadelphia, Pennsylvania
1969-1971	Research Engineer Westinghouse Research and Development Center Medical Systems Division, Life Support Systems Churchill, Pennsylvania
1971-1980	Research Engineer National Institutes of Health Biomedical Engineering Branch Bethesda, Maryland
1980-1984	Assistant Professor of Bioengineering and Neurosurgery University of Pennsylvania School of Engineering and Applied Science Philadelphia, Pennsylvania
1984-1991	Associate Professor of Bioengineering and Neurosurgery University of Pennsylvania Department of Bioengineering School of Engineering and Applied Science Philadelphia, Pennsylvania
1991-1994	Professor and Chairman University of Pennsylvania Department of Bioengineering School of Engineering and Applied Science Philadelphia, Pennsylvania
1991-1995	Professor of Bioengineering in Neurosurgery and Orthopaedic Surgery School of Medicine University of Pennsylvania Philadelphia, Pennsylvania
1982-1995	Associate Director, Head Injury Center Department of Neurosurgery School of Medicine University of Pennsylvania

1990-1995	Executive Director, Laboratories for Injury Research and Prevention Department of Bioengineering University of Pennsylvania
1995-1998	Professor in Neurosurgery and Director, Division of Bioengineering Department of Neurosurgery Allegheny University of the Health Sciences
1998-2001	Professor School of Biomedical Engineering, Science and Health Systems Drexel University
2000-present	Founder, Biomechanics, Inc.

ADMINISTRATIVE RESPONSIBILITIES:

1980-1981	Secretary, Bioengineering Department Faculty, University of Pennsylvania
1982	Search Committee, Chairman of Bioengineering University of Pennsylvania
1983-1986	Chairman, Security Committee, University of Pennsylvania
1984-1985	Personnel Committee, SEAS, University of Pennsylvania
1990-1991	Undergraduate Curriculum Chairman, Bioengineering University of Pennsylvania
1991-1994	Department Chairman, Bioengineering University of Pennsylvania
1992-1994	Search Committee, Chairman, Orthopaedic Surgery School of Medicine, University of Pennsylvania
1995-1999	Center for Neuroscience, Research Planning Committee, AUHS, MCP- Hahnemann School of Medicine
1997	University Research Committee
1997	Search Committee, Chairman, Department of Rehabilitation and Physical Medicine, AUHS

MEMBERSHIP IN SCIENTIFIC AND PROFESSIONAL SOCIETIES:

- 1976-1977 Chairman, Industrial Activities Committee, Bioengineering Division, The American Society of Mechanical Engineers
- 1978-1981 Chairman, Medical Devices Standards Committee, Bioengineering Division, The American Society of Mechanical Engineers
- 1980-1985 Executive Committee, Bioengineering Division, The American Society of Mechanical Engineers
- 1982 Executive Council, Alliance for Engineering in Medicine and Biology
- 1982 Program Chairman, Bioengineering Winter Annual Meeting, The American Society of Mechanical Engineers
- 1982 General Chairman, Annual Conference on Engineering in Medicine and Biology
- 1982 Chairman, Bioengineering Division, American Society of Mechanical Engineers
- 1988 Neural Trauma Society
- 1990 Association for the Advancement of Automotive Medicine, AAAM
- 1995 Board of Directors, AAAM

RESEARCH EXPERIENCE AND DIRECTION:

- Experimental Head Injury Laboratory - NINCDS - NIH,
1980-1982. Co-Principal Investigator \$ 340,000
- Determination of the Constitutive Properties of Brain
and Experimental Stress Analysis in Head Injury,
Biomechanics Department, U.S. D.O.T., NHTSA, 1982-1984,
Principal Investigator \$ 200,000
- Computerized Analysis of the Biomechanical Correlations
of Head Injury, Biomechanics Department, U.S.D.O.T., NHTSA
1982-1984, Co-Principal Investigator \$ 200,000
- Experimental Head Injury Laboratory - NINDCS - NIH
1982-1985, Co-Principal Investigator \$ 800,000

Physical Model Experiments in Head Injury Biomechanics, Biomechanics Department, U.S.D.O.T., NHTSA, 1985 Principal Investigator	\$ 110,000
Effects of Mechanical Stress on Matrix Synthesis in Endothelial Cell Culture, NHLBI - NIH 1985-1990, Co-Principal Investigator	\$ 750,000
Experimental Head Injury Laboratory, NINCDS - NIH 1985-1988, Co-Principal Investigator	\$ 1,300,000
Torsional Driving Point Impedance Characterization of the Head, Ohio State University and NHTSA 1985, Principal Investigator	\$ 37,000
Automated Digitization of High Speed Film of Physical Model Experiments, Wayne State University and General Motors Corp. 1986, Principal Investigator	\$ 25,000
Biomechanics of Neural and Neurovascular Injury Centers for Disease Control 1987-1990 Principal Investigator	\$ 780,000
Biomechanics of Human Injury (Program Project) Centers for Disease Control, 1990-1993, Principal Investigator.	\$ 1,100,000
The Head Injury Center National Institutes of Health, NINCDS, 1990-1993 Co-Principal Investigator.	\$ 1,700,000
Effect of Mechanical Forces on Vascular Cells National Institutes of Health, NHLBI, 1991-1995 Co-Principal Investigator.	\$ 400,000
Biomechanics of CNS Injury (Program Project) Centers for Disease Control, 1993-1996 Principal Investigator	\$ 1,200,000
The Head Injury Center National Institutes of Health, NINCDS, 1993-1998 Co-Principal Investigator	\$ 3,750,000
Biomechanics of Neuro and Neurovascular Injury Centers for Disease Control, 1996-1999 Principal Investigator	\$ 1,100,000

Mild Traumatic Brain Injury in the NFL, 1997-1999 NFL Charities Principal Investigator	\$ 165,000
Pediatric Head Injury The Kimmel - Spiller Foundation, 1998 Principal Investigator	\$ 50,000
A System to Estimate a Concussion Severity Index-Phase I SBIR, NINDS, NIH (submitted), 2003 Principal Investigator	\$ 90,000
Retreval of Axons Post Acute Trauma-Phase I SBIR, NINDS, NIH (in preparation), 2003 Principal Investigator	\$ 98,000

JOURNALS/ EDITOR, REVIEWER:

Annals of Biomedical Engineering

Biophysical Journal

Journal of Biomechanical Engineering

Journal of Biomechanics

Journal of Neural Trauma

Journal of Neurosurgery

Journal of Orthopaedic Research

Journal of Dental Research

Society of Automotive Engineers

Association for the Advancement of Automotive Medicine

International Research Conference on the Biokinetics of Impact

Advisory Group for Aerospace Research and Development

TEACHING EXPERIENCE:

B.E. 100	Introduction to Bioengineering (Lectures in Injury Biomechanics)
B.E. 200 / 203	Intermediate Biomechanics (<u>Originator of Course</u>)
B.E. 209	Bioengineering Laboratory (<u>Originator of Course</u>)
B.E. 350	Momentum, Energy and Mass Transport
B.E. 352	Applied Physical Chemistry
B.E. 451	Advanced Transport Phenomena
B.E. 462	Bioengineering Design for Chemical Engineering Minors (<u>Originator of Course</u>)
B.E. 462-465	Mechanical, Chemical, Materials and Electrical Design Recitation
B.E. 495	Senior Design Thesis
B.E. 510	Continuum Mechanics
B.E. 633	Biofluids II (Low Reynolds Number Hydrodynamics) (<u>Originator of Course</u>)
B.E. 700	Special Topics in Biomechanics and Trauma (<u>Originator of Course</u>)
B.E. 899	Biomechanics of Brain and Spinal Cord Injury (<u>Originator of Course</u>)

FOUR COURSE SEQUENCE IN BIOMECHANICS: (Developed for the PhD Program at Allegheny University of the Health Sciences)

- A. Cellular and Molecular Biomechanics
- B. Tissue Mechanics
- C. Organ Biomechanics
- D. Whole Body Biomechanics

Supervised 90 students in B.E. 100 projects

Supervised 47 Senior Design Theses

Dissertation Committee Member:

28 students in Bioengineering
5 students in Chemical Engineering

DISSERTATIONS / THESES - SUPERVISED:

Bianchi, Annette, M.S. Thesis, University of Pennsylvania, "Physical Model Studies of Acute Subdural Hematoma", 1983.

Hess, Karen Luke, M.S. Thesis, University of Pennsylvania, "Analytical Model for Acute Subdural Hematoma", 1985.

Margulies, Susan Sheps, Ph.D. Dissertation, University of Pennsylvania, "Biomechanics of Traumatic Coma in the Primate," 1987.

Green, Catherine, M.S. Thesis, University of Pennsylvania, "Response of Isolated Vascular Tissue to High Strain Rate Extension", 1987.

Galbraith, James, Ph.D. Dissertation, University of Pennsylvania, "Effects of Stretch on the Electrophysiology of the Giant Axon of the Squid", 1987.

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Winston, Flaura, Ph.D. Dissertation, University of Pennsylvania, "The Modulation of Intracellular Free Calcium Concentration by Biaxial Extensional Strains of Bovine Pulmonary Artery Endothelial Cells", 1989. M.D., University of Pennsylvania 1991.

Barbee, Kenneth, Ph.D. Dissertation, University of Pennsylvania, "Mechanism for Vascular Smooth Muscle Cell Response to Mechanical Stimuli", 1991.

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Meaney, David, Ph.D. Dissertation, University of Pennsylvania, "Biomechanics of Acute Subdural Hematoma in the Primate and Human", 1991.

Landsman, Adam, Ph.D. Dissertation, University of Pennsylvania, "Response of Aging Vascular Cells to Mechanical Stimulation", 1992.

Saatman, Kathryn, Ph.D. Dissertation, University of Pennsylvania, "Response of an Isolated Myelinated Nerve Fiber as a Model for Neural Trauma", 1993.

Cargill, Robert, Ph.D. Dissertation, University of Pennsylvania, "A Cell Culture Model for Neural Injury", 1994

Billiar, Kristin, M.S., An In-Vitro Model for Mechanically Induced Vasospasm, University of Pennsylvania, 1994.

Arbogast, Kristy, M.S., The Constitutive Properties of the Human Brain Stem, University of Pennsylvania, 1995.

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LaPlaca, Michelle, Ph.D. Dissertation, University of Pennsylvania, " Hydrodynamically Induced Shear Stress Effects on Neuronal Cells in Culture- A Model for neural Trauma", 1996

Goldstein, Daniel, Ph.D. Dissertation, University of Pennsylvania, "The Biomechanics of Cervical Spine Injury", 1997.

Blackman, Brett, Ph.D. Dissertation, "The Response of Endothelial Cells to Variable Strain Rate Loading-The Viscoelastic Behavior of the Cell Membranes", 1998

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VISITING PROFESSORSHIPS:

Georgia Institute of Technology
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 University of Pittsburgh
 University of Virginia
 Massachusetts Institute of Technology
 Harvard University
 Ohio State University
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LECTURES BY INVITATION:

Thibault, L.E. "In-Vitro Models for Neural Injury", Naval Medical Research Institute, Bethesda, Maryland, 1980

Thibault, L.E. "Cardiopulmonary Bypass Device Standards: An Engineering Perspective", American Academy of Cardiovascular Perfusion, C.C. Reed, ed., San Francisco, California, Vol. 2, 1981.

Thibault, L.E. "Biomechanics of Head Injury and Isolated Tissue Studies", Biomechanics Department, National Highway Traffic Safety Administration, U.S. Department of Transportation, Washington, D.C., 1981.

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PROGRAMS/PROJECT RESPONSIBILITIES (INDUSTRIAL AND GOVERNMENT RESEARCH LABORATORY EXPERIENCE 1963-1979)

U.S. Naval Ship Engineering Center:

Vibration Studies of the J75-FT4 Gas Turbine Propulsion System

Vibration Studies of the Saturn Gas Turbine Driven Generator System

Controls System Analysis of the Jupiter Gas Turbine Driven Generator System

Sea Salt Aerosol Studies for the Development of Separator Systems for Gas Turbine Engines

Control System Design for Smokeless Combustion in Gas Turbine Propulsion Systems

Field Studies, Trouble-Shooting, Failure Analysis and Repair of Gas Turbine Engines in the Fleet

All reports written for Department of Defense Documentation Center.

Westinghouse Research and Development Center:

Whole Body Oxygen Uptake Rate Monitor

Blood Oxygen Content Analyzer

Continuous Blood pO₂ Catheter

Portable Breathing Apparatus for Emergency Use

Computerized Patient Monitoring System with Non-Fade Display, Electronic Memory and Arrhythmia Detection

Long-Term Portable Breathing Apparatus with CO₂ Scrubbing and Chemical Generation of Oxygen

Rescue Vehicle for Mine Disasters

National Institutes of Health:

System for the Experimental Investigation of Head Injury in the Primate, NINCDS

Kinematic Linkage to Produce Controlled Inertial Loading of an Experimental Model in Head Injury Research, NINCDS Dense Piezoelectric Accelerometer for Use in the Brain During Inertial Loading Studies, NINCDS

Physical Models of the Skull and Brain for Use in Dynamic Moire Analysis of Strain, NINCDS

System for the Experimental Investigation of Head Injury in the Primate, NINCDS Solid-State Programmer for Auto-Sequencing High Speed Photography, Oscillographic Recording, Hydraulic and Pneumatic Operations in Experimental Head Injury, NINCDS

Kinematic Linkage to Produce Controlled Inertial Loading of Experimental Animal Model in Head Injury Research, NINCDS

System to Obtain High Speed X-Rays of Implants in the Brian Undergoing Steady-State Vibration, NINCDS

Neutrally Dense Piezoelectric Accelerometer for Use in the Brain During Inertial Loading Studies, NINCDS

Physical Models of the Skull and Brain for Use in Dynamic Moire Analysis of Strain, NINCDS

Fluidic Controlled Indentor for Studies of Brain Tissue Deformation and Concomitant Neurophysiological Alterations, NINCDS

Optical Device for the Measurement of Intracranial Pressure, NINCDS

Life Support System for Papillary Muscle Culture Including Dialysis and Membrane Oxygenation, NHLBI

Isometric Force Transducer and Electrical Simulation for Muscle Tissue Culture Systems, NHLBI

System to Culture Palatal Specimens from Fetal Mice Including Video Monitoring via Fibre Optic Probes of the Palatal Region, NIDR

System to Measure the Mechanical Properties of Skin, NCI

Fluidic-Controlled Pulsatile Mattress for Surgical Tables, NINCDS

System to Apply Controlled Levels of Hydrodynamically-Induced Wall Shear Stress on Arterial Tissue Specimens In-Vitro, NHLBI

Automated System for Video-Densitometry, NHLBI

Calibration System for an Electrochemical Shear-Rate Transducer, NHLBI
Automated Differential, pH, Thermal, Titration Apparatus, NHLBI

Automated System to Measure the Hemoglobin-Oxygen Equilibrium Curve for Sample of Whole Blood or Hemoglobin Solutions, NHLBI

Capillary Membrane Oxygenator, NIA

Reaction Cell for Automated Potentiometric Titration and Spectrophotometric Analysis, NIAMD

System to Mechanically Stress Biological Cell in Culture, NIDR

Automated and Computer-Controlled Exercise Stress Test Device Which Includes the Determination of Anaerobic Threshold from Respiratory Gas Analysis, NHLBI

System to Produce Transient Hydrostatic Pressure Loading and Large Scale Deformation of Nerve Fibers In-Vitro, NINCDS

System to Study the Somatosensory Evoked Responses in Children and Adults Through Mechanical Stimulation of the Proprioceptive Fibers, NINCDS

Device to Measure the Displacement of the Axonal Membrane of the Squid During the Propagation of the Action Potential, NIMH

System to Automatically Decontaminate an Ultracentrifuge and Its Contents in the Event of Catastrophic Failure, NIAID

Device to Measure the Mechanical Properties of Peripheral Nerve In Situ, NINCDS

Thermistor for the Measurement of Heats of Reaction in Protein Titrations, NHLBI

Analytical Model for Potassium Transport in the Cortex, NINCDS

Analysis of Heat Transfer During Whole Body Hyperthermia Treatment of Metastatic Cancer, NCI

CONSULTING ACTIVITIES:

1975-1976	Armed Forces Radiobiology Research Institute,
1980-1986	Southwest Research Institute
1980-Present	National Institutes of Health, National Heart, Lung, and Blood Institute, Laboratory for Technical Development
1981	Chairman, National Consensus Workshop on Head and Neck Injury, Experimental Modeling, NHTSA, D.O.T.
1982-Present	United States Army
1983-Present	National Institutes of Health, National Institute of Arthritis and Metabolic Disease
1983	Association Peugeot -Renault
1983	Commonwealth of Pennsylvania, Department of Transportation
1983-Present	Commonwealth of Pennsylvania, Attorney General
1984-Present	National Institutes of Health, National Institute of Neurological Communicative Disease and Stroke
1984-Present	Technical Advisory Board, Neonatal Products, CAS Medical
1986	Joint Chiefs of Staff, Department of Defense.
1986-Present	General Motors Corporation
1989-Present	Chrysler Corporation.
1990-Present	Suzuki
1992	The Whitaker Foundation
1992-Present	Daimler Benz
1992-Present	Bell Sports
1993-Present	Yamaha

1995-Present	Black and Decker
1995-Present	Makita
1994-Present	The National Center for Injury Prevention and Control CDC, Atlanta
1994-Present	Honda
1994-Present	Mazda
1994-Present	Ford Motor Company
1994-Present	Daimler Chrysler
1998-Present	The National Football League
1999-Present	Specialty
2000-Present	Isuzu
2000-Present	Conrail
2000-Present	Fisher - Price
2000-Present	Riddell
2000-Present	Canadian Pacific
2001-Present	Kia
2001-Present	Nissan
2002-Present	Freightliner
2002-Present	Graco
2002-Present	New Jersey Transit
2002-Present	SEPTA
2002-Present	PECO
2003-Present	Volvo

Lawrence Tibbault's Testimony (July 2001 - Current)

Caption Taiquan Barlow

Caption Hillock v. Graco

Trial

Trial

Deposition 4/9/2003

Deposition 5/16/2002

Caption McLaughlin v. Michael R. Brassard and Fisher Engineering

Caption Perry v. Badger Express

Trial

Trial

Deposition 9/13/2002

Deposition 11/7/2002

Caption Mulligan v. Essex County Improvement Authority

Caption Mohney v. Bauer

Trial

Trial

Deposition 4/15/2002

Deposition 10/16/2002

Caption Gonzalez v. Bermudez

Caption Briggs v. Graco

Trial

Trial

Deposition 6/25/2002

Deposition 2/2/2004

Caption Garmon v. Daimler Chrysler Corporation, et al.

Caption Parikh v. Migala & The Fitness Super Store, Inc.

Trial

Trial

Deposition 10/4/2002

Deposition 5/21/2003

Caption Vaden v. Bell Helmets, Inc., et al.

Caption Zatlukovicz v. Conrail

Trial

Trial

Deposition 5/10/2002

Deposition 10/29/2002

Caption Perez and Castanon v. Riddell, Inc., et al.

Caption Jopson v. Bugada

Trial

Trial

Deposition 5/22/2002

Deposition 7/23/2003

Caption Marsella v. DePiano

Caption Kania v. Larson

Trial

Trial

Deposition 3/19/2002

Deposition 11/24/2003

Caption Sosa v. Giovine

Caption Abbott v. Freightliner

Trial

Trial

Deposition 6/14/2002

Deposition 3/4/2004

Caption Dresdner v. Chrysler

Caption Frometa v. Velda Farms

Trial

Trial

Deposition 11/13/2002

Deposition 5/1/2003

Caption Umali v. USA Cycling

Trial
Deposition 10/29/2003

Caption Rosen v. USF Red Star

Trial
Deposition 6/3/2004

Caption Garcia v. Atlantis Submarines

Trial
Deposition 4/26/2005

Caption Valdivia v. Century Products

Trial
Deposition 3/2/2004

Caption Bell v. Suzuki

Trial
Deposition 8/31/2004

Caption Gibson v. DaimlerChrysler

Trial
Deposition 5/18/2005

Caption Wheaton v. Ford Motor Company

Trial
Deposition 3/4/2005

Caption Lawson v. Graco

Trial
Deposition 9/17/2004

Caption Tedder v. Ford Motor Company

Trial
Deposition 1/18/2006

Caption Benson v. Riddell

Trial
Deposition 7/8/2005

Caption Roberts v. McRay Crane & Rigging, Inc.

Trial
Deposition 3/30/2005

Caption Albo v. Evenflo

Trial
Deposition 12/14/2005

Caption Wozniak v. Metabo AG

Trial
Deposition 6/29/2005

Caption Schroeder (Rachel)

Trial 3/11/2002
Deposition

Caption Calabrese v. Konick, et. al.

Trial 4/24/2002
Deposition

Caption Benjamin v. Mehrrens

Trial 6/11/2002
Deposition

Caption Clark v. DeMarsico

Trial 6/21/2002
Deposition 4/18/2002

Caption Fedor v. Freightliner

Trial 7/11/2002
Deposition

Caption Milligan v. Ford

Trial 8/22/2002
Deposition 10/9/2001

Caption Sison v. Daimler Chrysler, Corp.

Trial 8/23/2002
Deposition

Caption Potochnick v. Perry

Trial 10/15/2002
Deposition

Caption Schwartz v. General Motors

Trial 10/23/2002
Deposition

Caption Stapleton v. Freightliner

Trial 12/18/2002
Deposition 8/16/2002

Caption Quinby (John)

Trial 1/28/2003
Deposition

Caption Levering v. Bryant

Trial 4/2/2003
Deposition

Caption Commonwealth v. Galt, III

Trial 5/6/2003
Deposition

Caption Allen v. GM

Trial 6/13/2003
Deposition 3/13/2003

Caption Carpenter v. Mobile Dredging and Pumping Co.

Trial 6/17/2003
Deposition

Caption DeGenaro v. Ford

Trial 11/12/2003
Deposition

Caption Womack v. Fallon

Trial 3/30/2004
Deposition

Caption Dredden v. Mazoch

Trial 4/1/2004
Deposition

Caption Sanders v. Bauer

Trial 10/22/2004
Deposition 12/16/2003

Caption Schneider, Christopher

Trial 1/25/2005
Deposition

Caption Nguyen v. State Farm

Trial 2/3/2005
Deposition 8/24/2004

Caption McIntyre v. Clark Equipment Company

Trial 4/21/2005
Deposition

Caption Limburg v. Koehring Cranes, Inc.

Trial 10/20/2005
Deposition 6/24/2005
